



# Healthy Habitats for Healthy Wildlife

Sarah Van de Berg  
Wildlife Health Biologist



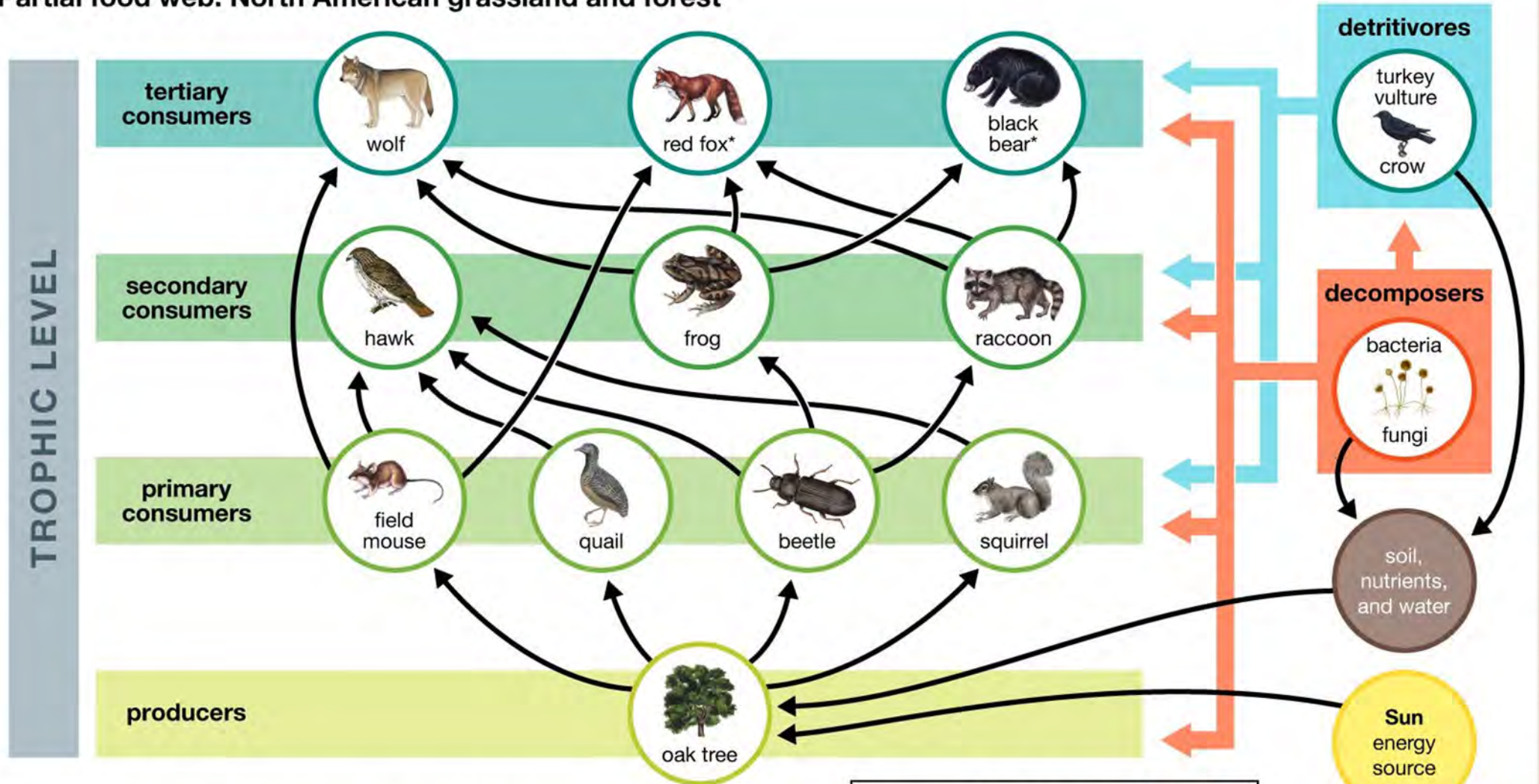
# All Things Are Interconnected

Do you even appreciate  
what I do for you??



# All Things Are Interconnected

Partial food web: North American grassland and forest



\*Red foxes (*Vulpes vulpes*) and black bears (*Ursus americanus*) are omnivores, and thus they are very often considered to be secondary consumers. However, in this food web they function as tertiary consumers.

← Indicates direction of energy flow



# Ecosystem Health

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## Robert Costanza & Michael Mageau 1999

A healthy ecosystem is one that is sustainable –

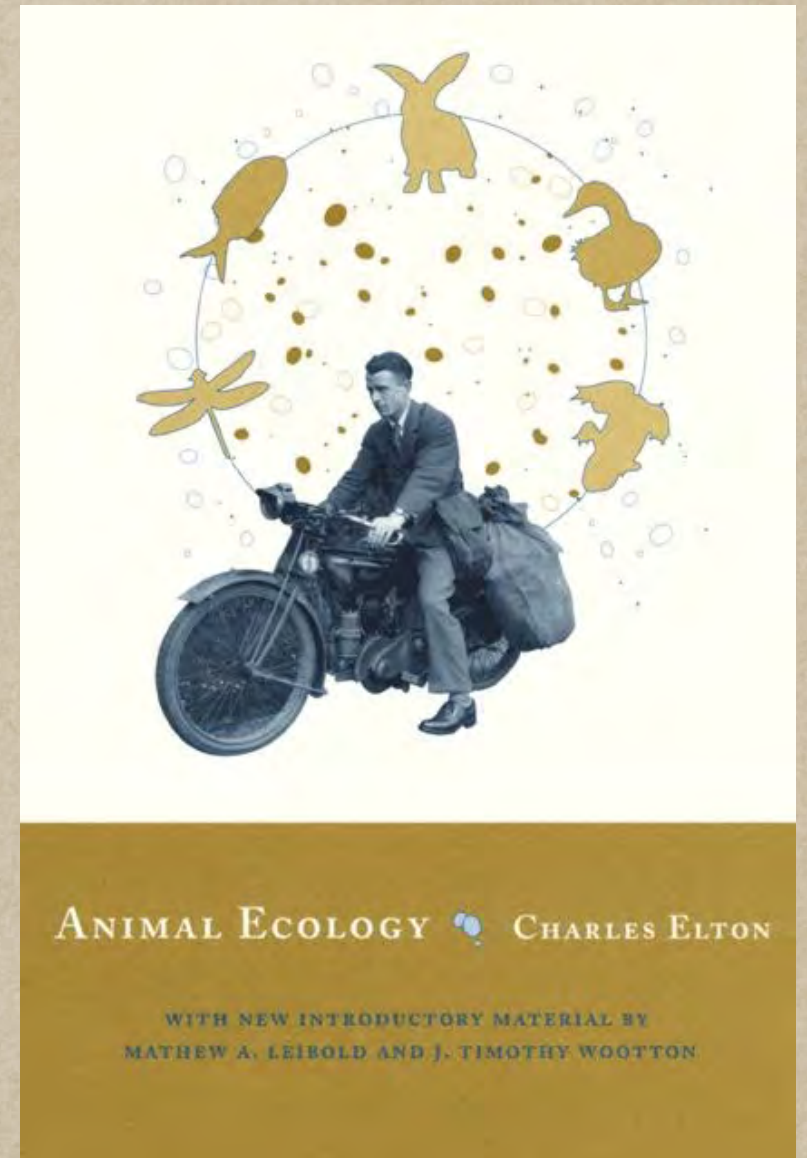
That is, it has the ability to maintain its **structure** (organization) and **function** (vigor) over time in the face of **external stress** (resilience).



# Disease Ecology

**Charles S. Elton, 1958**

“outbreaks [of infectious diseases] most often happen on cultivated or planted land... that is, in habitats and communities very much simplified by man”





# One World, One Health

**One Health** is the idea that the health of people is connected to the health of animals and our shared environment.

When we protect **one**,  
we help protect **all**.



[www.cdc.gov/onehealth](http://www.cdc.gov/onehealth)





# What is Wildlife Health?

## Wildlife health is essential for life on Earth



The survival of humans, animals, and plants depends on the health of their ecosystems. Bats and bees are essential pollinators, small mammals maintain soil health, coral reefs produce oxygen and capture carbon, fruit-eaters disperse seeds, and predators help control the populations of other species. Ecosystems are only as healthy as the wildlife that lives within them and require rich biodiversity to thrive.



“Wildlife Health” is the ability of wildlife to thrive in a changing environment. The health and resiliency of wildlife are influenced by many factors such as genetics, physiological capacity, disease status, exposure to environmental threats and pollution, interactions with human populations, and climate change.



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**We're working on it!**

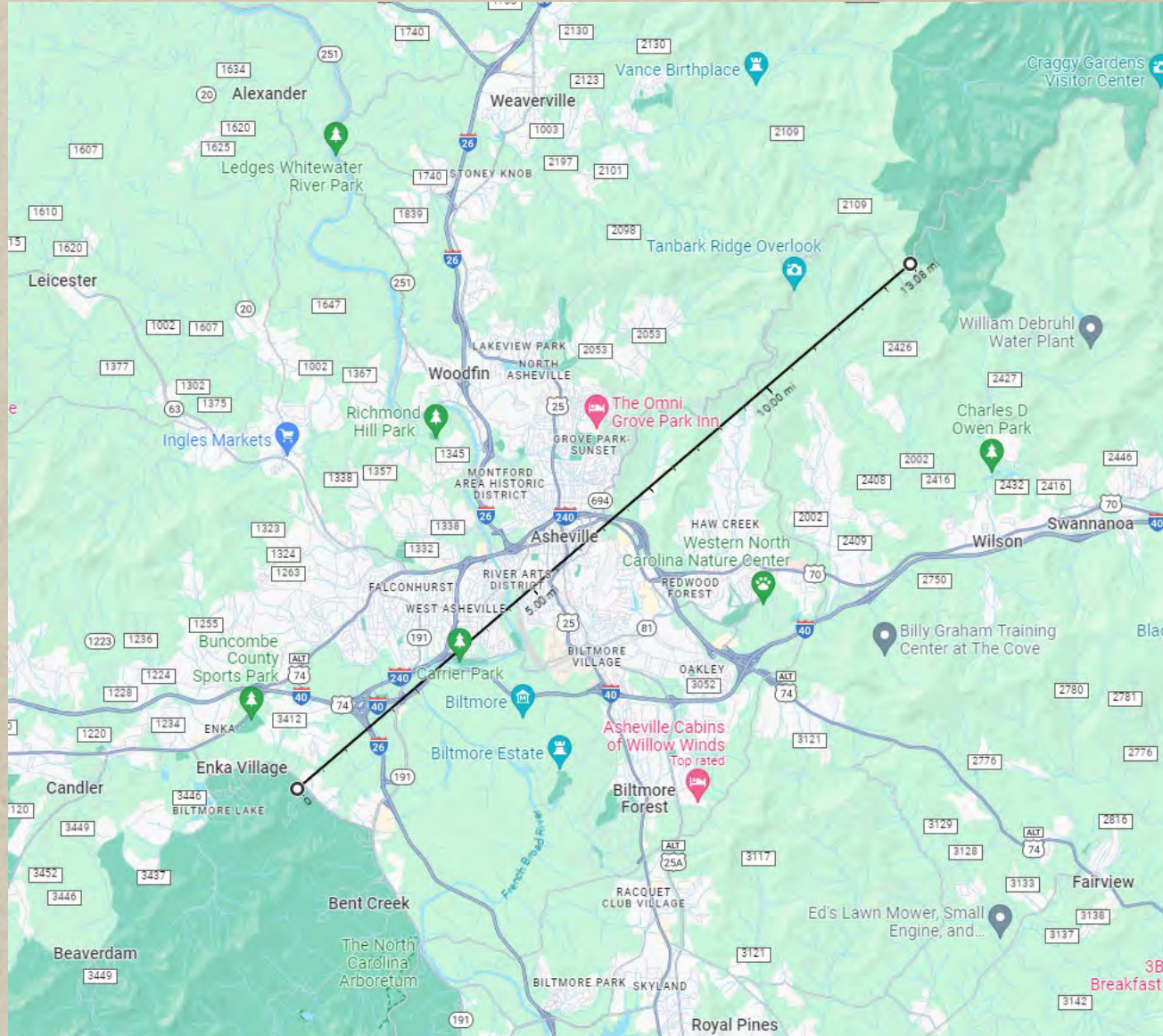


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# Human Activity and Wildlife Disease

Pisgah National Forest

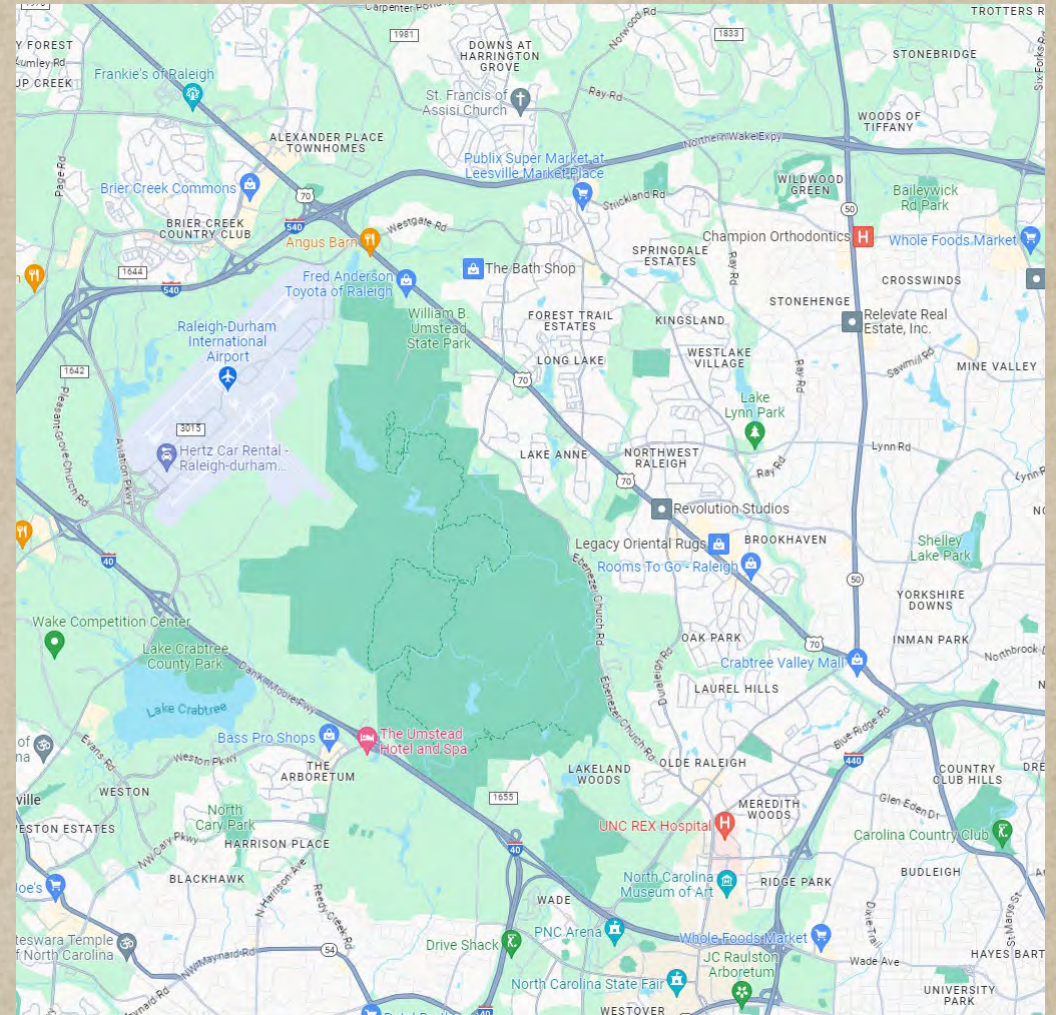


Nantahala National Forest





# Human Activity and Wildlife Disease





# Habitat Fragmentation & Degradation



Chris Austin



Wildlands Network/NPCA

## HABITAT FRAGMENTATION

is what happens when land is developed and only little patches of original ecosystems are left.



These little pieces of nature linger alone in the margins of our industrial landscapes, farms, suburbs, and cities.

Trapped in isolation, species in fragments often die off.



With so many species trapped in these little patches all over the world, what can we do to help?

Damschen, E.L., et al. 2019 Science.  
<https://tinyurl.com/y4na8syru/>

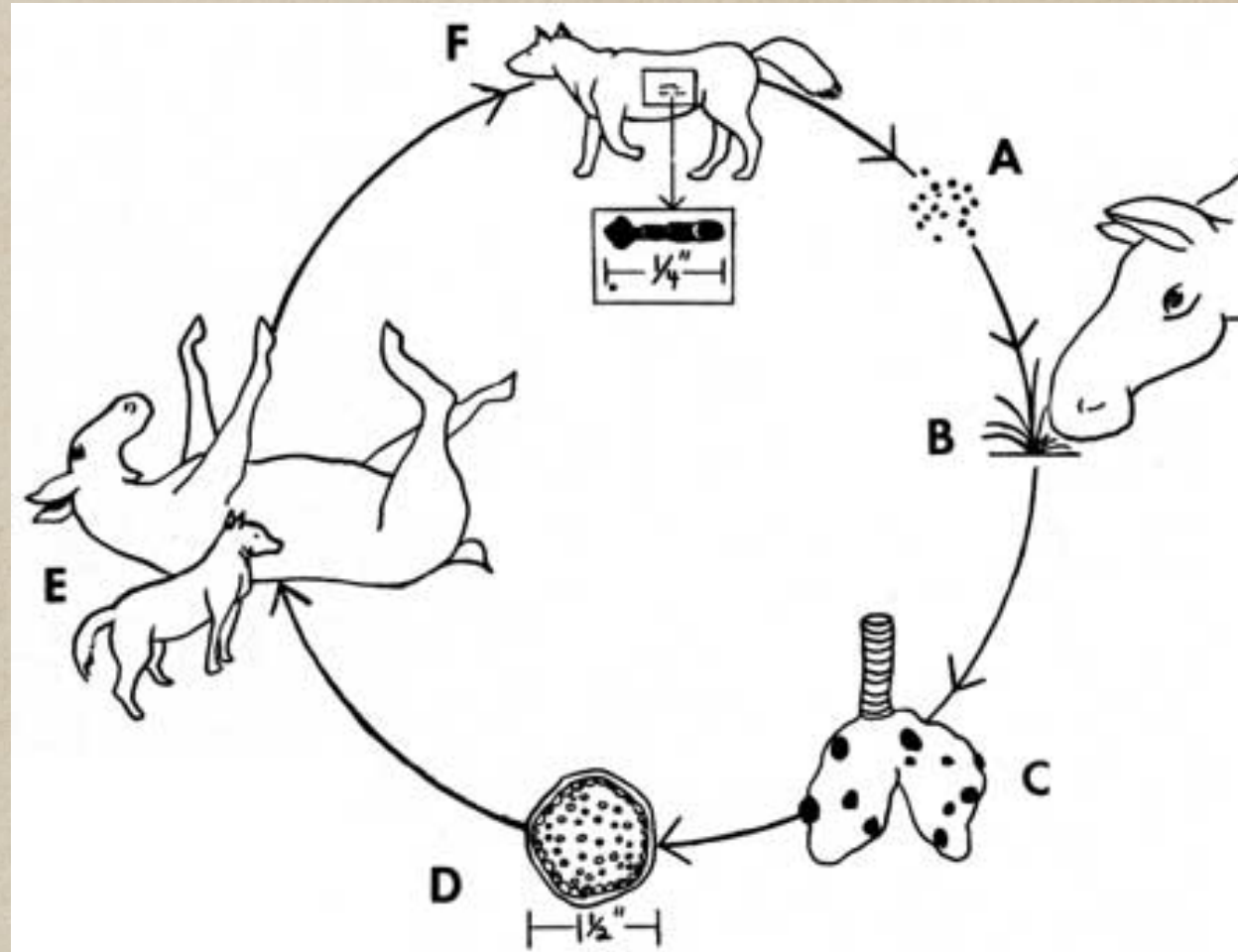
Art by Liz Anna Kozik  
[liz.kozik.net](http://liz.kozik.net)



**Let's talk about a few diseases!**



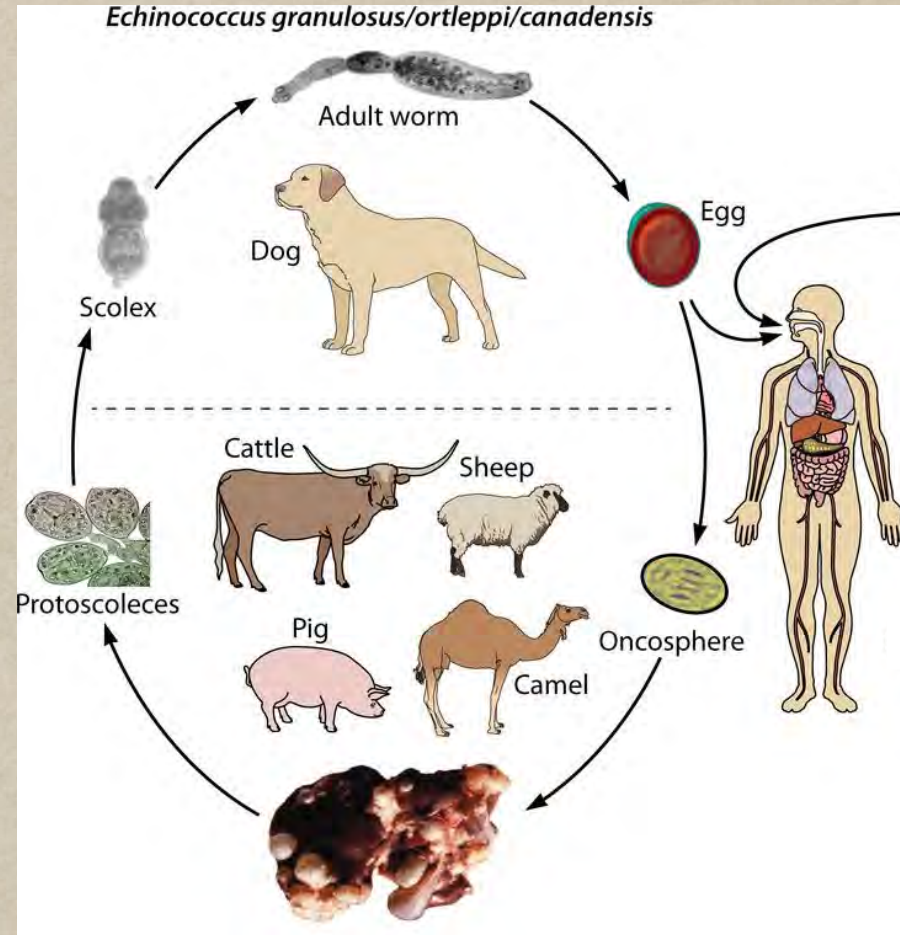
# *Echinococcus canadensis*



Credit: L. David Mech, PhD  
The Wolves of Isle Royal 1966



# *Echinococcus canadensis*



Credit: Hao Wen, American Society for Microbiology



# Parasite Problems?

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**Think about what brings the animals to your property**

- **What's their food source? Water? Shelter?**

**Limit pet contact with rodents and rolling in feces**

**Wash your hands when you come inside and before you eat**

**Species diversity can break the cycle**



# Deer Hemorrhagic Disease



Credit: Xinmi Zhang, Ph.D.



# Deer Hemorrhagic Disease



Credit: donotdisturbgardening.com



Credit: usgs.gov



Credit: Getty Images



# Biting Midge Problems?

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**Deer don't transmit these viruses to each other, but high deer densities can assist in the spread.**

**Plant native forage for deer, not feeders. Fence off gardens.**

**Clean up standing water, poor drainage sites (it'll help with mosquitos, too)**

**Vernal pools and moving water support predators of midges.**

**Support habitat for swallows and spiders, too!**



# House Finch Eye Disease

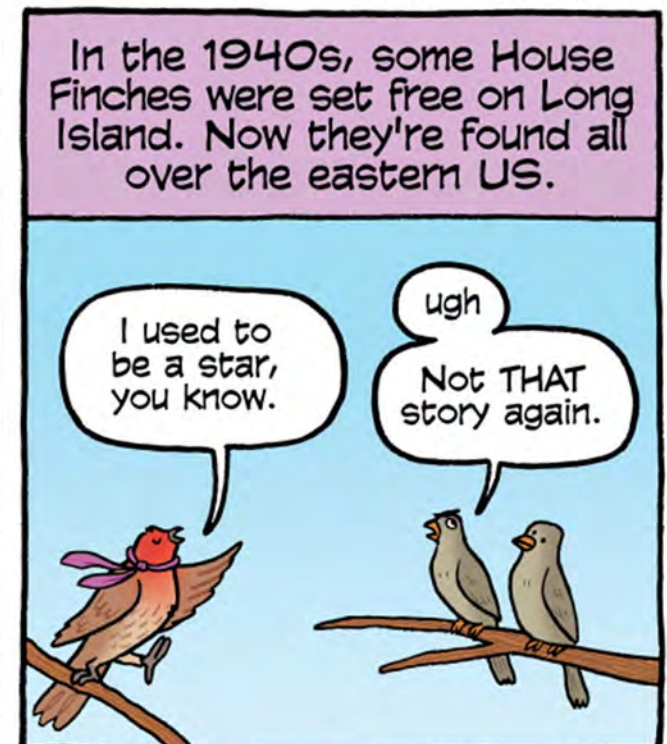




# House Finch Eye Disease

## REAL HOUSE FINCHES OF HOLLYWOOD

YOURWILDCITY.COM





# Bird eye problems?

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Plant native forage for birds

Clean bird feeders at least every 2 weeks (weekly for hummingbirds)

- Empty all the seed, scrub off any visible dirt with hot water and a brush, wash in 10:1 water:bleach solution, allow to completely air dry before refilling.

See sick birds? Take the feeders down for a minimum of 2 weeks.



# What Else?

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- **Support vernal pools-NC has a huge diversity in amphibians**
- **Loose slash piles-birds and small mammals love them!**
- **Add a log to a pond for some turtles to bask on**
- **Maintain tree diversity in age and species structures to support wildlife that have different needs**
- **Leave some dead trees standing**
- **Leave a fallen tree or two down**
- **Consider regular prescribed burning to control ticks and invasive plants**
- **Replant edge habitat with feathered edges**
- **Pick a favorite local species and focus on their needs in your under-utilized spaces**



# Biodiversity impacts Lyme disease

FEBRUARY 28, 2013 | *POUGHKEEPSIE JOURNAL* | BY JOHN FERRO

SHARE:

LYME DISEASE, BIODIVERSITY



A new weapon in the fight against Lyme disease may come not from a pill or an injection, but idea — preserving a rich array of wildlife.

**ars TECHNICA** BIZ & IT TECH SCIENCE POLICY CARS GAMING & CULTURE

SCIENCE — **Diseases thrive where biodiversity is low**

Research shows that decreasing biodiversity may lead to increases in the ...

KATE SHAW YOSHIDA · 12/6/2010, 9:20 PM

11 Species loss may be one of the most pressing global issues of our time, impacting everything from the climate to our vulnerability to natural disasters. But how might decreasing biodiversity affect disease transmission? "It depends."

**THE LANCET**  
Planetary Health

COMMENT | VOLUME 1, ISSUE 1, E2-E3, APRIL 2017 [Download Full Issue](#)

**Biodiversity loss and the ecology of infectious disease**

Richard S Ostfeld

Open Access • Published: April, 2017 • DOI: [https://doi.org/10.1016/S2542-5196\(17\)30010-4](https://doi.org/10.1016/S2542-5196(17)30010-4)

## Biodiversity and health

### How nature can protect us from pandemics



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Science News

# Healthy Ecosystems Limit Disease in Humans and Wildlife

June 16, 2015

by Molly Michelson

**nature**

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nature > review articles > article

Published: 01 December 2010

## Impacts of biodiversity on the emergence and transmission of infectious diseases

Felicia Keesing , Lisa K. Belden, Peter Daszak, Andrew Dobson, C. Drew Harvell, Robert D. Holt, Peter Hudson, Anna Jolles, Kate E. Jones, Charles E. Mitchell, Samuel S. Myers, Tiffany Bogich & Richard S. Ostfeld

*Nature* 468, 647–652 (2010) | [Cite this article](#)

83k Accesses | 1198 Citations | 586 Altmetric | [Metrics](#)

IN-DEPTH ANALYSIS  
Requested by the ENVI committee

## The link between biodiversity loss and the increasing spread of zoonotic diseases



**Thank you!**

Sarah Van de Berg  
Wildlife Health Biologist